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ORIGINAL RESEARCH ARTICLE

Development of Character Education in Contextual-Based Mathematics Textbooks at Jurai Siwo State Islamic University of Lampung

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ABSTRACT

The current mathematics textbooks are general and do not fully meet the needs of both lecturers and students. Many students of the Tadris Mathematics program still lack an understanding and personal competence in character education. It is crucial to develop teaching materials, especially for the vector analysis course, that are aligned with the specific needs of students and lecturers. This study aims to explore the development steps of a Contextual Mathematics Textbook Integrated with Character Education at the Jurai Siwo State Islamic University of Lampung. This research uses a Research and Development (R&D) approach. The development procedure for the vector analysis teaching material follows the Borg and Gall model. Based on expert validity, the findings are as follows: (1) The content suitability aspect with the curriculum received a 93% rating with the qualification "Very Good," (2) The construction aspect received a 94% rating with the qualification "Very Good," and (3) The readability aspect received a 90% rating with the qualification "Good." Overall, based on the trial with 70 Tadris Mathematics students, the aspects of ease, appeal, and comprehensibility of the design achieved an overall percentage of 81.54%, which is categorized as "Very Good." It is hoped that by developing this mathematics textbook, students will gain an understanding of character education, ensuring that Jurai Siwo State Islamic University of Lampung graduates are not only intellectually capable but also possess the personal qualities associated with national character education. Students agree that the material in the mathematics textbook can enhance character education.

Keywords: Mathematics Textbook, Character Education, Contextual Learning, Assessment

ABSTRAK

Buku ajar matematika masih bersifat umum dan belum memenuhi kebutuhan dosen dan mahasiswa. Banyaknya mahasiswa Tadris Matematika yang belum memahami dan memiliki kecakapan personal pendidikan karakter. Pentingnya dikembangkan bahan ajar khususnya pada matakuliah analisis Vektor yang disesuaikan dengan kebutuhan mahasiswa dan dosen. Tujuan Penelitian untuk mengetahui langkah-langkah pengembangan buku ajar Matematika Berbasis Kontekstual Berintegrasi Pendidikan Karakter di UIN Jurai Siwo Lampung. Penelitian ini menggunakan jenis penelitian dan pengembangan yang dikenal dengan R&D singkatan dari Research and Development. Prosedur penelitian dan pengembangan pada bahan ajar analisis vektor menggunakan model pengembangan Bord and Gall. Berdasarkan hasil validitas ahli diperoleh; (1) aspek kesesuaian isi materi dengan kurikulum meperoleh persentase 93% dengan kualifikasi " Sangat Baik", (2) Aspek kontruksi memperoleh persentase 94% dengan kualifikasi "Sangat Baik", dan (3) Aspek Keterbacaan memperoleh persentase 90% dengan kualifikasi "Baik". Secara keseluruhan berdasarkan hasil uji coba desain aspek keterbacaan pada 70 mahasiswa Tadris Matematika dari aspek kemudahan, aspek kemenarikan dan aspek keterpahaman diperoleh hasil keseluruhan persentase 81,54%, dengan kreteria sangat baik. Harapannya dengan mengembangkan buku ajar matematika ini, mahasiswa memiliki pemahan tentang pendidikan karakter. Sehingga lulusan UIN Jurai Siwo Lampung bukan hanya cerdas juga memiliki kecakapan personal pendidikan karakter bangsa. mahasiswa setuju materi buku ajar matematika dapat meningkatkan pendidikan karakter

Kata Kunci : Teksbook Matematika, Pendidikan Karakter, Kontekstual Learning, Penilaian

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1. INTRODUCTION

Learning is a process of action and reaction between educators and students and learning resources within a learning environment. Learning is an effort to transfer scientific knowledge, skills, traits, and character formation for students. Thus, learning is not merely about making students intellectually intelligent from the cognitive aspect but also about changing the affective aspect or attitudes and influencing the psychomotor aspect or skills (Djamaluddin & Wardana, 2019).

Learning resources are tools used by educators and students in the learning process. Learning resources include textbooks or printed books, print or electronic media, resource persons, and the surrounding environment. Learning resources should be designed to meet the needs of students and lecturers and be aligned with the learning curriculum. The absence of appropriate learning resources is one of the obstacles in the learning process. Particularly for Tadris Mathematics students, printed teaching materials are still very minimal. As a result, students still rely on electronic media such as the internet as their primary literacy source without prior filtering. Many negative elements are easily accessible to students through electronic media, which can affect their personality and mindset. The researcher feels the need to create teaching materials to meet the needs of both lecturers and Tadris Mathematics students.

There is currently no representative textbook that can support the needs of students and lecturers in enhancing students' understanding. A contextual-based textbook is expected to be a solution to the problems occurring on campus, especially in Tadris Mathematics. Numerous studies have

developed contextual teaching materials and have proven to improve student learning outcomes. Contextual learning is defined as a learning strategy that directly involves students in the process of acquiring knowledge by connecting learning theory with real life, so that students are invited to directly apply it in daily life (Afriani, 2018). In contextual learning, problems or real situations around students act as external stimuli for action, and students respond concretely to these problems.

Based on the developed behaviorism learning theory, learning theory is known as behavioral development theory or the study of human behavior viewed from student learning outcomes influenced by the learning process. In behavioral development theory, learning is not only a process of transferring knowledge, but learning can also change a person's behavior for the better. In other words, a person's or student's behavior can affect learning outcomes, so education is not just about providing knowledge but also about character change for students. Learning outcomes provide feedback (character education) that functions as a reinforcement of positive behavior so that students repeat it in the future.

Character education has a very important role in national education, especially in shaping the nation's moral character. The numerous cases of brawls among students are evidence of low morals and character education in the educational environment. Based on *kompas.com*, many brawl cases have occurred among university students recently from 2019 to 2022. In 2019, on September 28, a brawl occurred on Youth Pledge Day between groups of students from different faculties at Makassar State University, South Sulawesi. In the same year, on September 7, a brawl occurred between female students from two different campuses, Pancasila University and Unas, due to personal issues. In 2022, on June 16, a brawl occurred between the Faculty of Teacher Training and Education and the Faculty of Engineering at Patimura University, Ambon, due to mutual mockery, resulting in many students suffering injuries from stone-throwing. On September 12, 2022, in Banda Aceh, a group of students from the Faculty of Agriculture and the Faculty of Engineering at Syiah Kuala University, Banda Aceh, were involved in a brawl due to a literary quote from "Buku Cinta dan Pesta" (The Book of Love and Parties), which resulted in casualties and damage to several campus facilities. In the same year, a brawl and chase occurred between fellow students from the Faculty of Economics and Business until midnight.

According to the Great Dictionary of the Indonesian Language, the meaning of character is the nature, temperament, and morals inherent in a person's personality, formed based on ways of thinking and behavior grounded in the results of internalization until it becomes a distinctive feature of an individual (Ummah, 2019). Character education is a system of character values knowledge, accompanied by awareness, willingness, and responsible actions towards oneself, others, society, the nation, and especially towards God Almighty.

The objectives of character education as stated by the Ministry of Education and Culture are as follows: To develop the spiritual, emotional, and affective potential of students as human beings and members of society who possess cultural values and national character. To develop commendable behavior and habits of students in line with cultural traditions and the universal religious values of the nation. To develop leadership and responsibility in students and enable them to be responsible as the next generation of the nation. To develop students' abilities to become nationally insightful, creative, and independent human beings. To develop the school environment

as a friendly learning environment, fostering creativity, honesty, trustworthiness, and a strong sense of nationalism full of strength.

The graduate profile of state Islamic universities is not only to produce intelligent graduates but also those with personal competence demonstrated through attitudes. The attitude aspect in education consists of 11 learning outcomes: (1) students are able to demonstrate a religious attitude and devotion to God Almighty; (2) students are able to carry out tasks based on religious values, ethical values, and moral values that uphold human values; (3) students can contribute to improving the quality of national and state life based on Pancasila values; (4) students have a sense of responsibility to the nation and state as well as a sense of nationalism; (5) students can respect others' opinions and the originality of others' discoveries, diverse cultures, perspectives, religions, and beliefs; (6) students are able to care about the environment and society and have the ability to cooperate and possess social sensitivity; (7) students live in society and the state obedient to law and discipline; (8) students are able to internalize norms, values, and academic codes of ethics; (9) students are able to demonstrate a sense of responsibility for work in their field of expertise independently; (10) students are able to internalize the spirit of entrepreneurship, independence, and struggle. It is expected that these ten aspects can be incorporated into learning materials which serve as learning resources for students.

Based on the Regulation of the Minister of National Education No. 11 of 2005, a textbook is a required reference book used in schools and/or universities that contains learning materials aimed at mastering science and technology in an effort to enhance personality, character, and faith and piety (Maunah, 2016). A textbook is a book whose content describes learning materials in a particular field of study oriented towards assimilation, development, and learning for students (Nasution & Surya, 2015). A textbook is a guidebook for educators and students in learning activities that contains subject matter, investigative activities based on concepts, science, information, and examples of the application of knowledge in real life. Therefore, a textbook is a systematically arranged text containing learning materials as a handbook for teachers/lecturers and a guide for students in achieving learning objectives.

Current mathematics textbooks are still general and do not meet the needs of lecturers and students. There is no textbook that can connect textbooks with character education directly linked to real life. This is one of the important factors necessitating the development of a Vector Analysis textbook. It is crucial to develop teaching materials, especially for the Vector Analysis course, that are tailored to the needs of students and lecturers. Many Tadris Mathematics students still lack understanding and personal competence in character education. The benefits of writing a textbook are explained by the National Department of Education as follows: (1) it can assist students in the learning process; (2) it can help educators present material more easily; (3) it can provide more free time for students to be guided in learning; (4) it can make educators not the only source of learning so that students are not dependent on teachers/lecturers; (5) it can foster motivation in students to understand and absorb lessons for self-development (Kebudayaan, 2019). Based on the background above, the objective is to determine how character education is developed in Contextual-Based Mathematics Textbooks at the Jurai Siwo State Islamic University of Lampung.

2. RESEARCH METHODS

This research employs a Research and Development (R&D) design, a methodological approach used to produce a specific product and subsequently test its effectiveness (Sugiyono, 2016). The primary product developed in this study is a contextual-based Vector Analysis textbook, which is specifically designed to be integrated with character education values, aiming to address the identified needs of both students and lecturers.

Research Design

The development procedure for the Vector Analysis teaching materials follows the Borg and Gall model, a comprehensive framework comprising ten distinct steps: (1) potential and problems, (2) data collection, (3) product design, (4) design validation, (5) design revision, (6) product trial, (7) product revision, (8) usage trial, (9) final product revision, and (10) mass production (Sugiyono, 2016). However, due to significant time and cost constraints, this research was deliberately limited to the seventh step, as this point is considered sufficient to establish the product's feasibility and validity, ensuring the research remains focused and manageable while still achieving its core developmental objectives.

Data Collection

Data for this developmental research was gathered using two primary techniques: questionnaires and interviews. Questionnaires were employed to collect quantitative data on the product's appeal and feasibility from three expert validators and from the student trial subjects. Concurrently, semi-structured interviews were conducted during the preliminary study phase with a smaller number of respondents, specifically Tadris Mathematics lecturers and the Head of the Study Program, to gain a deeper, more qualitative understanding of the existing problems and to inform the textbook's needs analysis.

Data Analysis

The data collected from questionnaires were analyzed quantitatively using a descriptive percentage formula ($p = f/n$) to determine the validity and practicality scores from experts and students. The data obtained from the needs analysis and student response questionnaires were processed using the same formula to calculate the percentage of agreement or feasibility. Meanwhile, data from the interviews were analyzed qualitatively to provide contextual depth and substantiate the findings from the quantitative instruments, ensuring a comprehensive understanding of the development needs.

Research Instruments

The primary research instrument used was a set of closed-ended questionnaires, developed based on a Likert scale. These questionnaires were specifically designed for different purposes: a needs analysis questionnaire for students, validation questionnaires for expert validators (covering material, media, and language), and a response questionnaire for students. The needs analysis questionnaire used a four-point scale (Strongly Agree to Strongly Disagree), while the expert and student response questionnaires used a five-point scale to evaluate aspects such as content

suitability, construction, and readability. The data from these instruments were then analyzed using a descriptive percentage formula ($p = f/n$) to determine the quality and feasibility of the developed textbook.

Validity and Reliability

To ensure the quality of the developed product, validity and reliability were assessed using the Likert scale criteria. The validity of the textbook was determined through expert judgment, where the average scores from the validators were converted into percentages and categorized based on a predetermined scale. A product was considered valid and practical if it achieved a percentage score of 61% or higher, qualifying it as "Valid" or "Very Valid." This clear benchmark provided a structured and objective method for evaluating the textbook's feasibility and determining if further revisions were necessary.

Research Subject and Location

This research was conducted at the Tadris Mathematics Department of the Jurai Siwo State Islamic University of Lampung, located in Metro City, Lampung. The study subjects were 80 active Generation Z students enrolled in the Tadris Mathematics program during the 2022/2023 academic year, specifically those in semesters 4 and 6 who had either completed or were currently enrolled in the Vector Analysis course. The sample was selected using a purposive sampling technique based on their direct experience with the course material, ensuring that their feedback was both relevant and reliable for assessing the textbook's development needs and its subsequent effectiveness.

3. RESULTS AND FINDINGS

Description of the Developed Textbook

The Contextual-Based Mathematics Textbook for the Vector Analysis course was systematically developed based on a thorough needs analysis involving both students and lecturers at Jurai Siwo State Islamic University of Lampung. The textbook was compiled by integrating several key components: Content Standards, Syllabus, Semester Learning Plan (RPS), Graduate Learning Outcomes (CPL), Contextual Approach principles, Character Education values, and various reference sources relevant to Vector Analysis. The product was specifically designed to address the gap identified in the preliminary study, where students lacked adequate printed teaching materials that could simultaneously support mathematical understanding and character development. The front cover of the developed textbook is presented in Figure 2 below, showcasing the design that was carefully crafted to appeal to Generation Z students.

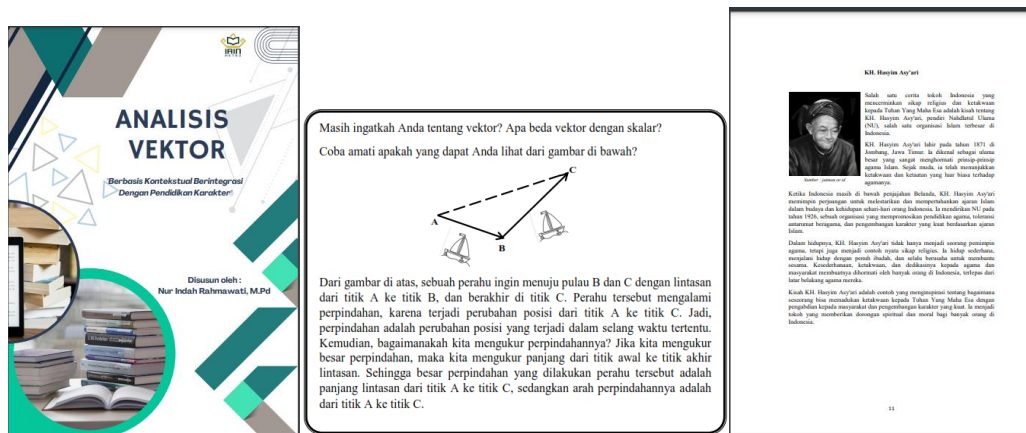


Figure 2. Vector Analysis Textbook

The textbook is structured based on the RPS, with each chapter containing specific components: learning objectives and learning outcomes; suggestions for studying the material; comprehensive teaching materials; practice exercises; and answer keys. The material is organized into ten chapters, from Chapter I (Vectors and Scalars) to Chapter X (Curvilinear Coordinates), with each chapter designed to be both comprehensive and accessible. The content incorporates contextual learning approaches by connecting mathematical concepts to real-life situations, such as boat displacement, car motion, water flow, and other daily phenomena. Additionally, character education values are embedded throughout the textbook, with four distinct character themes distributed across the chapters: religious devotion (Chapters I-II), internalization of academic ethics (Chapters III-IV), responsibility and independence (Chapters V-VII), and holistic self-understanding as an educator (Chapters VIII-X). The integration of contextual elements and character values in the textbook is illustrated in the sample pages shown in Figure 3 and Figure 4 below.

The textbook is divided into three main sections: opening, content, and closing. The opening section includes the cover page, compiling team and editors, preface, table of contents, list of character values, and graduate learning outcomes (CPL). The content section forms the core of the textbook, containing character education elements, contextual material concepts, core subject matter, worked examples, and practice questions. The closing section provides answer keys, a bibliography, an index, the author's biography, and the back cover. This comprehensive structure ensures that students have all necessary resources within a single, self-contained learning tool. The textbook presents images and Vector Analysis materials that seamlessly integrate contextual learning and character education, making abstract mathematical concepts more tangible and relatable to students' daily experiences.

The development process paid careful attention to three critical quality aspects: content suitability with the curriculum, construction quality, and readability. The textbook was validated by three experts in their respective fields: a mathematics material expert, a contextual expert integrated with character values, and a learning media expert. The validation results, summarized in Table 3 below, demonstrated that the textbook achieved high scores across all assessed aspects. The learning media also underwent limited trials with Tadris Mathematics students to determine their responses,

and the results were overwhelmingly positive, confirming that the textbook is highly practical and feasible for use in the Vector Analysis course.

The primary obstacle encountered during the development of this textbook was the scarcity of existing contextual-based textbooks integrated with character education, particularly for mathematics learning in the Vector Analysis course. This scarcity meant that the researcher had limited references and models to draw upon when compiling the teaching materials, requiring extensive effort to design original content that effectively combined mathematical concepts with contextual applications and character values. Additionally, the research process was considerably time-consuming, as it had to be conducted alongside the lecturer's other academic responsibilities, including the three pillars of higher education (*tri dharma*): teaching, research, and community service. Balancing these competing demands extended the development timeline significantly. Another practical challenge was ensuring that the contextual illustrations and character education elements were appropriately designed to be both engaging for Generation Z students and educationally effective without overwhelming the core mathematical content.

Strengths and Weaknesses of the Interactive Learning Media

The developed textbook exhibits several notable strengths that contribute to its effectiveness as a learning media tool. The design utilizes the Liveworksheets platform, a digital tool for creating electronic worksheets, which significantly facilitates the design and distribution of learning materials. The textbook design was intentionally kept simple and user-friendly to ensure ease of use for both lecturers and students. The visual appearance features bright and attractive color combinations specifically chosen to appeal to the preferences of Generation Z students, thereby increasing engagement and motivation. The integration of contextual education and character education represents a significant added value, as it allows students to simultaneously develop mathematical competencies and character traits essential for their personal and professional lives. Furthermore, the textbook is carefully aligned with the CPL for Vector Analysis learning in the Tadris Mathematics program, ensuring that it directly supports the achievement of program learning outcomes.

However, the textbook also has certain limitations that should be acknowledged. The most significant weakness is that the textbook was specifically developed based on the unique needs and characteristics of Tadris Mathematics students at Jurai Siwo State Islamic University of Lampung. Consequently, it may require adjustments and adaptations before it can be effectively implemented in other study programs or at other universities. The contextual examples and character education themes, while highly relevant to the Jurai Siwo State Islamic University of Lampung context, might not be as directly applicable to institutions with different cultural or educational environments. Additionally, while the textbook received excellent validation scores, it has not yet undergone extensive field testing with larger and more diverse student populations. Future research and development efforts should focus on conducting broader usage trials, making necessary revisions, and testing the textbook's effectiveness across different educational settings to maximize its potential impact.

4. DISCUSSION

This discussion presents a comprehensive analysis of the Contextual-Based Mathematics Textbook Integrated with Character Education developed at the Jurai Siwo State Islamic University of Lampung, examining the textbook's description, development process, obstacles encountered, and evaluation of its strengths and limitations. The integration of contextual learning approaches with character education represents a significant innovation in mathematics pedagogy, particularly in higher education settings where developing both cognitive and affective competencies is increasingly recognized as essential for producing graduates who are not only intellectually capable but also possess strong personal character (Biryukova, 2020; Madrazo & Dio, 2020). This study contributes to the growing international literature demonstrating that contextual teaching methods positively influence the development of personal meanings in university students' mathematics learning, suggesting that such approaches are particularly effective in higher education contexts where students often struggle to see the relevance of abstract mathematical concepts to their future professional lives (Biryukova, 2020; Buckingham, 2025).

The Contextual-Based Mathematics Textbook for the Vector Analysis course was systematically developed based on a thorough needs analysis involving both students and lecturers at Jurai Siwo State Islamic University of Lampung, integrating several key components: Content Standards, Syllabus, Semester Learning Plan (RPS), Graduate Learning Outcomes (CPL), Contextual Approach principles, Character Education values, and various reference sources relevant to Vector Analysis. The product was specifically designed to address the gap identified in the preliminary study, where students lacked adequate printed teaching materials that could simultaneously support mathematical understanding and character development. This approach aligns with research by Madrazo and Dio (2020), who demonstrated that contextualized learning modules effectively bridge students' learning gaps by integrating real-world concepts and situations into mathematics instruction, thereby promoting independent learning and enhancing student engagement. The front cover of the developed textbook (Figure 2) showcases a design carefully crafted to appeal to Generation Z students, reflecting the importance of visual appeal in contemporary educational materials. The textbook is structured based on the RPS, with each chapter containing specific components: learning objectives and outcomes, suggestions for studying, comprehensive teaching materials, practice exercises, and answer keys, organized into ten chapters from Chapter I (Vectors and Scalars) to Chapter X (Curvilinear Coordinates).

The content incorporates contextual learning approaches by connecting mathematical concepts to real-life situations, such as boat displacement, car motion, water flow, and other daily phenomena, a strategy supported by research showing that contextual questions are generally beneficial for students' interest, motivation, engagement, and attainment in mathematics (Buckingham, 2025). Buckingham (2025) further found that even a small number of contextual questions can improve students' attitudes towards mathematics, with students overwhelmingly favouring the inclusion of at least some contextual questions in their mathematics modules. Additionally, character education values are embedded throughout the textbook, with four distinct character themes distributed across the chapters: religious devotion (Chapters I-II), internalization of academic ethics (Chapters III-IV), responsibility and independence (Chapters V-VII), and holistic self-understanding as an educator (Chapters VIII-X), as illustrated in Figure 3 and Figure 4. This integration of character values aligns with research by Wicaksana, Suparta, and Suharta (2020), who developed contextual

mathematics teaching devices oriented to character development and found that such materials met the criteria for validity, practicality, and effectiveness, with characteristics including connecting learning to phenomena occurring around students, real problems, and local culture, while providing emphasis on character, freedom of opinion, and mutual respect. The textbook is divided into three main sections: opening, content, and closing, with the opening section including the cover page, compiling team and editors, preface, table of contents, list of character values, and graduate learning outcomes (CPL); the content section forming the core with character education elements, contextual material concepts, core subject matter, worked examples, and practice questions; and the closing section providing answer keys, bibliography, index, author biography, and back cover.

The development process paid careful attention to three critical quality aspects: content suitability with the curriculum, construction quality, and readability, with the textbook validated by three experts in their respective fields: a mathematics material expert, a contextual expert integrated with character values, and a learning media expert. The validation results, summarized in Table 3, demonstrated that the textbook achieved high scores across all assessed aspects, with the construction aspect receiving the highest rating of 96%, content suitability with curriculum achieving 93%, and readability attaining 90%. These findings are consistent with the research by Wicaksana, Suparta, and Suharta (2020), who found that contextual mathematics teaching devices oriented to character development successfully met validity, practicality, and effectiveness criteria, resulting in improved learning motivation and mathematics learning outcomes encompassing both cognitive and affective aspects. The learning media also underwent limited trials with Tadris Mathematics students, and the results were overwhelmingly positive, confirming that the textbook is highly practical and feasible for use in the Vector Analysis course. This aligns with findings from Sukandar (2020), who analyzed character education values in mathematics textbooks and found that textbooks often only apply limited character values, highlighting the need for more comprehensive integration of character education in mathematics teaching materials. The successful integration of character education into mathematics textbooks has been a growing area of research internationally, with studies demonstrating that character education in mathematics learning can be implemented by integrating character values in math assignments, delivering character values through learning media, and integrating character values in math textbooks or modules (Nurhayati et al., 2022).

The development of this textbook followed the Borg and Gall research and development model, which comprises ten systematic stages, though this research was deliberately limited to the seventh step (product revision) due to significant time and cost constraints, as this point was considered sufficient to establish the product's feasibility and validity. This pragmatic approach to R&D is consistent with practices reported in other studies, where researchers have adapted the Borg and Gall model to fit their specific constraints while maintaining the integrity of the development process (Permatasari, 2022; Caswita, 2020). The systematic nature of this model ensures that each stage of development builds upon the previous one, allowing for iterative refinement based on expert feedback and user trials. Research by Caswita (2020) on developing mathematical teaching books based on realistic approaches to increase creative thinking ability also referred to the Borg and Gall theory, demonstrating the model's widespread applicability in mathematics education research. The research and development approach employed in this study is grounded in the theoretical framework established by Borg and Gall, which has been widely adopted in

mathematics education research for developing valid, practical, and effective instructional materials that enhance students' conceptual understanding (Permatasari, 2022).

The primary obstacle encountered during the development of this textbook was the scarcity of existing contextual-based textbooks integrated with character education, particularly for mathematics learning in the Vector Analysis course, meaning the researcher had limited references and models to draw upon when compiling the teaching materials. This challenge reflects a broader gap in the literature, as most existing studies on contextual mathematics education have focused on elementary or secondary levels rather than higher education. Budiman, Samani, Rusijono, Setyawan, and Nurdyansyah (2021) addressed this gap by developing a Direct-Contextual Learning model for higher education, demonstrating the feasibility and importance of contextual approaches at the university level. Additionally, the research process was considerably time-consuming, as it had to be conducted alongside the lecturer's other academic responsibilities, including the three pillars of higher education (*tri dharma*): teaching, research, and community service. Another practical challenge was ensuring that the contextual illustrations and character education elements were appropriately designed to be both engaging for Generation Z students and educationally effective without overwhelming the core mathematical content, a concern also noted by Buckingham (2025) who found that contextual questions are difficult and time-consuming for service-teaching mathematicians to create in large quantities without becoming contrived or irrelevant.

The developed textbook exhibits several notable strengths that contribute to its effectiveness as a learning media tool, with the design utilizing the Liveworksheets platform, a digital tool for creating electronic worksheets that significantly facilitates the design and distribution of learning materials. Research by Khikmiyah (2021) demonstrated that Live Worksheets can improve student activity and mathematical problem-solving skills with an outstanding category, while studies on developing mathematics e-modules using Liveworksheets as independent learning material during the COVID-19 pandemic confirmed the validity and practicality of such digital tools (Khikmiyah, 2021). The textbook design was intentionally kept simple and user-friendly to ensure ease of use for both lecturers and students, with bright and attractive color combinations specifically chosen to appeal to the preferences of Generation Z students, thereby increasing engagement and motivation. Research by Kaminski and Sloutsky (2020) supports this approach, demonstrating that colorful and contextualized materials are more effective for mathematics instruction. The integration of contextual education and character education represents a significant added value, as it allows students to simultaneously develop mathematical competencies and character traits essential for their personal and professional lives. Furthermore, the textbook is carefully aligned with the CPL for Vector Analysis learning in the Tadris Mathematics program, ensuring that it directly supports the achievement of program learning outcomes, consistent with research showing that character education in higher education aims to improve the quality of implementation and educational outcomes leading to the achievement of the formation of character and noble character of students as a whole (Kemdikbud, 2020).

The strengths of this textbook are further supported by international research on contextual mathematics education, with Biryukova (2020) finding that contextual teaching methods positively influence the development of personal meanings in university students' mathematics learning, suggesting that contextual approaches are particularly effective in higher education

settings. Research from the Philippines by Madrazo and Dio (2020) showed that contextualized learning modules could successfully bridge learning gaps while promoting independent learning, providing international validation for the approach taken in this study. The integration of character education into mathematics textbooks has also been validated internationally, with studies showing that character values such as democracy, civility, harmony, freedom, equality, justice, rule of law, patriotism, dedication, integrity, and friendship can be effectively integrated into the mathematics learning process at the university level (Nurhayati et al., 2022). However, the textbook also has limitations, most significantly that it was specifically developed based on the unique needs and characteristics of Tadris Mathematics students at Jurai Siwo State Islamic University of Lampung and may require adjustments and adaptations before it can be effectively implemented in other study programs or at other universities, with the contextual examples and character education themes potentially not being as directly applicable to institutions with different cultural or educational environments.

The findings of this study have several important theoretical and practical implications for mathematics education in higher education contexts, contributing to the growing body of literature demonstrating the effectiveness of contextual learning approaches in mathematics education and challenging the traditional view that mathematics is a value-neutral subject. The successful integration of character education into a mathematics textbook supports the broader educational paradigm shift toward holistic education that develops both cognitive and affective competencies, providing empirical support for the Borg and Gall R&D model as an effective framework for developing educational materials in higher education settings. Practically, the developed textbook offers a concrete example of how contextual learning and character education can be integrated into mathematics instruction at the university level, with its systematic organization of learning objectives, contextual examples, character education elements, and assessment tools providing a model that can be adapted by other educators and researchers. The high validation scores obtained (90-96%) suggest that this approach is both feasible and well-received by experts and students alike, demonstrating that it is possible to develop educational materials that simultaneously address multiple educational goals—mathematical competence, contextual understanding, and character development—without compromising the rigor of the mathematical content. Based on the findings and limitations of this study, future research should focus on conducting broader usage trials, making necessary revisions, testing the textbook's effectiveness across different educational settings, and exploring the integration of more advanced digital technologies to enhance the interactivity and effectiveness of contextual mathematics textbooks integrated with character education.

5. CONCLUSION AND SUGGESTIONS

Based on the research results, two main conclusions are drawn. Needs analysis from 80 students revealed that students and lecturers require a printed Vector Analysis textbook, as current resources are inadequate, while Vector Analysis concepts can connect to daily life to enhance understanding, and no existing mathematics textbook integrates character education, confirming the critical need for such a resource to ensure Jurai Siwo State Islamic University of Lampung graduates possess both intellectual intelligence and national character competence, with students strongly agreeing that the textbook can enhance character education. Further research should

conduct comprehensive usage trials and field testing to establish effectiveness across diverse contexts. Similar research should be developed using interactive media and different materials based on contextual approaches integrated with character education across various topics and educational levels.

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